

Michigan
Department of
Environmental Quality



Land and Water
Management Division

HYDRAULIC REPORT GUIDELINES

The following information is included in this packet.

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3. Discharge Request Form
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8. Sample Property Owner Statement
9. Cross Section Guidelines

THE TEN TENETS IN PREPARING A HYDRAULIC REPORT

1. *Read these guidelines before starting your hydraulic analysis.*
2. *Start downstream.*
3. *Look downstream and go left to right when stationing your cross section.*
4. *Look for downstream controls.*
5. *Improvements don't reflect far upstream.*
6. *Backwater can extend a long way upstream. Extend your model far enough upstream so that any increase is completely dissipated.*
7. *Show water surface elevation and date on each cross section.*
8. *Include a picture of the channel for each cross section and a few that are representative of the overbanks. Also include a few pictures of the structure (abutment, wing walls, head walls, low steel).*
9. *Look for and document high water marks and other evidence of past flooding.*
10. *Submit the entire report, not just the input and output data.*



Hydraulic Report Requirements

Department of Environmental Quality Land and Water Management Division

The Hydraulic Report provides an analysis and evaluation of the proposed projects effects on the 100-year frequency flood profile and the floodway/floodplain. The effects of the proposal need to be compared to existing conditions. The report should contain the following information:

1. **INTRODUCTION**

Describe the watercourse and location of investigation, for whom the report is being prepared, the name and type of project, scope of investigation including the alternatives analyzed and evaluated.

2. **METHOD OF ANALYSIS**

Describe computational methods used to determine water surface profiles. Indicate the limits of computational accuracy and explain any assumptions made in the application of a method. Include references and provide a description and source of any computer programs used. Hydraulic analysis computer programs such as HEC-RAS or HEC II from the US Army Corp of Engineers or HY-8 from the Federal Highway Administration are preferred. MDEQ approved discharges should be used in the analysis.

3. **VARIABLES AND COEFFICIENTS**

Include values selected for friction, expansion and contraction loss coefficients, orifice, and weir discharge coefficients. Provide representative photographs of present conditions and justify values selected for proposed conditions. Indicate references and explain all assumptions.

4. **STARTING POINT**

Describe the location where the water surface profile computations begin. Explain why the location was selected and the method used to determine the starting water surface elevation.

5. **DISCUSSION**

Provide a brief discussion and evaluation of the computations and analysis. Include a description of the present channel and floodway, nature and distribution of flow, proposed alterations and their resultant effect. Explain any unusual conditions that occur and all assumptions that were part of the analysis.

6. **CONCLUSION**

Provide a table comparing existing and proposed water surface elevations and energy grade lines. Evaluate the effects of the proposal on the floodway/ floodway and upstream areas. The analysis should extend far enough upstream that any increase caused by the proposed project is dissipated.

7. **APPENDIX**

- (a) Computations for the existing and proposed conditions - on a cd rom or 3.5 inch diskette.
- (b) Profile sheet showing the channel inverts, water surface and energy grade line for both existing and proposed conditions.
- (c) Site development plan or topographic map of the study area showing existing conditions, the proposed channel or floodway alterations, and the locations of cross sections. Show areas of proposed fill and proposed compensating cut. Provide computations for cut and fill.
- (d) Plans or sketches of existing and proposed bridges and culverts, including centerline profiles of the road grade. The information provided should be sufficient to analyze the crossings.
- (e) Cross sections showing existing conditions and the proposed alterations, channel and floodway limits, roughness coefficients, and the coordinates of plotted points.
- (f) If the proposed project causes an increase in the 100-year floodplain elevation, you must provide a certified Damage Assessment Certificate. If the proposed increase goes off the owner's property then you must also send by certified mail the "Affected Property Owner Statements" to all upstream property owners impacted by the proposed increase. Verification that the letters were sent out by certified mail must be provided to the DEQ.
- (g) A copy of the MDEQ discharge letter.

Requesting a Flood Discharge

You may submit your discharge request on-line at <http://www.deq.state.mi.us/eforms/qrecform.shtml>
Note that a site location map is required. You may fax the map to (517) 241-0275 (attention Hydrologic Studies Unit). Any questions regarding this process can be sent to Ric Sorrell at sorrell@michigan.gov or mailed to: Land & Water Management Division, Hydrologic Studies Unit, PO Box 30458, Lansing, MI 48909-7958.

Your Name :

Company :

Mailing address:

E-mail address:

Date :

Request for Flood Discharges: [Please indicate the frequency of the discharge(s) that you need; e.g 10%(10-yr), 2%(50-yr), 1%(100-yr), etc.]

Watercourse Name: [Please provide the name as it appears on the USGS Quadrangle map, if known, e.g. Smith Creek or Unnamed Tributary to Smith Creek]

Is this watercourse known locally by another name (what name)?

County:

Township:

Section:

Town:

Range:

Location: [Describe with as much detail as possible; e.g. Westernmost Trib to Smith Creek at private bridge, 1000 feet upstream of Smith Road, in the SW 1/4 of Section 4, T4N, R6E, Smith Township, Smith County]

Please provide a site location map. This should be a photocopied portion of the USGS quadrangle map or the county map with the site clearly marked on the map.

If you do not have access to email you may fax this form and map in directly to 517-241-0275 (attention Hydrologic Studies Unit)

HYDRAULIC CAPACITY CERTIFICATION
(Replacement Crossing)

RE: Road Name
 Stream Name
 Town, Range, Section
 Township
 County

I, Certifying Engineers Name & P.E. #, do hereby certify that the proposed _____ foot span by _____ foot rise bridge/culvert replacement including any change in road grade as shown on plans dated _____ is designed with an equal or greater hydraulic capacity when compared to existing conditions, and will not cause a harmful interference or damage to adjacent structures or croplands. Harmful interference is defined as an increased stage or change in direction of flow that causes or is likely to cause any of the following: damage to property; a threat to life; a threat to personal injury; pollution, impairment, or destruction of water or other natural resources.

HYDRAULIC CAPACITY CERTIFICATION (NEW CROSSING)

RE: Road Name
Stream Name
Town, Range, Section
Township
County

I, Certifying Engineers Name & P.E. #, do hereby certify that proposed _____ foot span by _____ foot rise bridge/culvert including the proposed road grade as shown on plans dated _____ is designed to pass the 100-year flood without causing a harmful interference or damage to adjacent structures or croplands. Harmful interference is defined as an increased stage or change in direction of flow that causes or is likely to cause any of the following: damage to property; a threat to life; a threat to personal injury; pollution, impairment, or destruction of water or other natural resources.

DAMAGE ASSESSMENT GUIDELINES

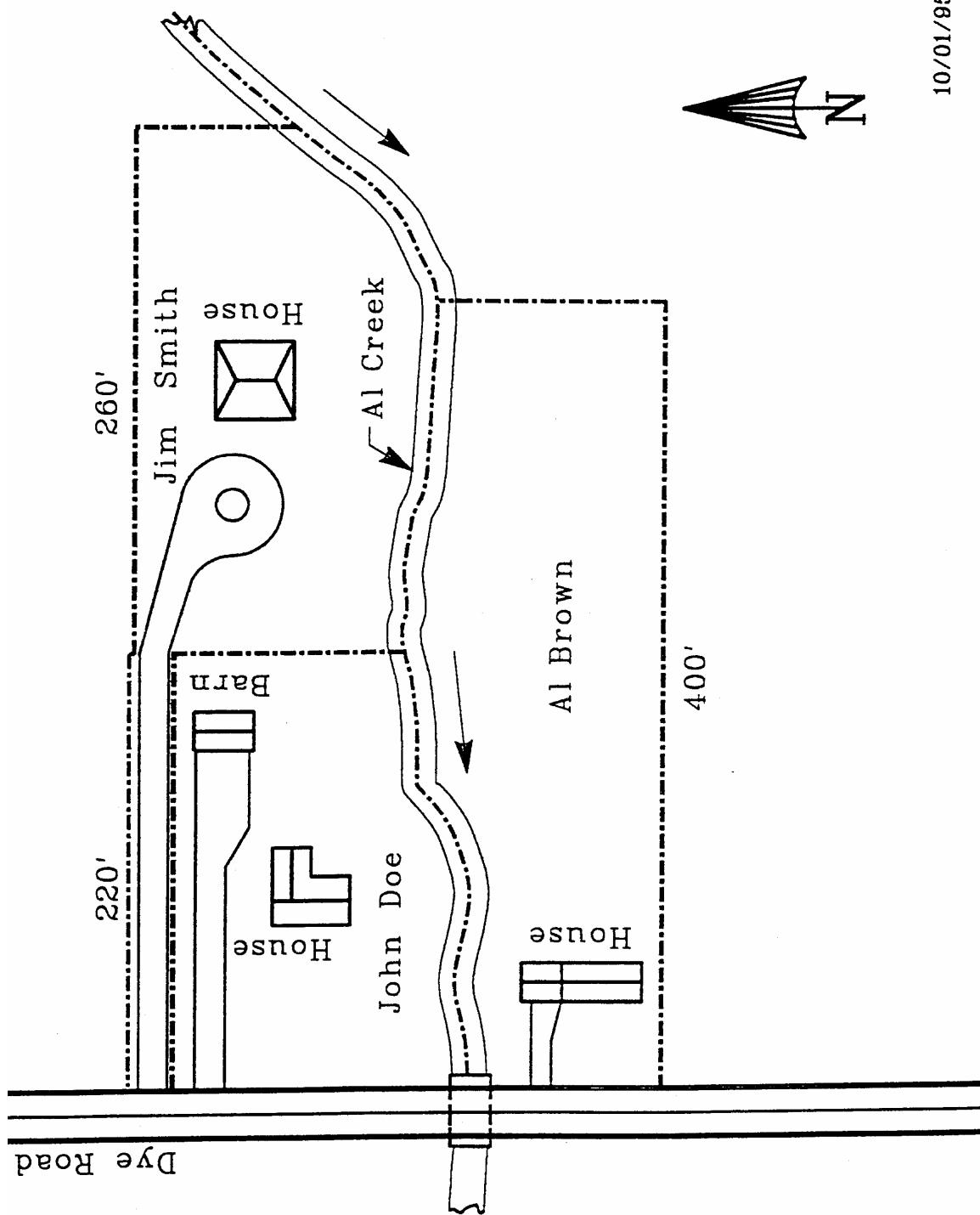
New or replacement stream crossings which cause an increase in flood stage that is not confined entirely within the limits of the applicant's property, require the following information to be submitted to the Land and Water Management Division of the Michigan Department of Environmental Quality.

1. Property location sketch, or a list of, all property owners located within the area affected by the increase in flood stage.
2. Show the location of all structures within the affected area, include the lowest adjacent ground elevation, the lowest floor elevation and the lowest sill elevation of a window or door of all structures located within the affected area.
3. A written damage assessment certification from a licensed engineer indicating that the increase caused by the project is not harmful.
4. Notification shall be sent by certified mail to the affected property owners indicating the extent of additional flooding and advising them to return the form to the DEQ within 10 days.

NOTE: Increases in flood stage will not be accepted for properties currently experiencing flood damage.

5. Copies of the letter sent to the affected property owners and the certified mail receipts must be submitted to the DEQ
6. Photographs of the affected properties and floodplain areas.

PROPERTY LOCATION SKETCH



10/01/95

DAMAGE ASSESSMENT CERTIFICATION

RE: Road Name
Stream Name
Town, Range, Section
Township
County

I, Certifying Engineers Name & P.E. #, do hereby certify that I have inspected the upstream adjoining properties and find that the reduction in hydraulic capacity and resulting _____ foot increase to upstream flood stages or diversion of flow will not cause a harmful interference or damage to adjacent structures or crop lands. Harmful interference is defined as an increased stage or change in direction of flow that causes or is likely to cause any of the following: damage to property; a threat to life; a threat to personal injury; pollution, impairment, or destruction of water or other natural resources. I further certify that the existing conditions have not caused environmental and/or property damage in the past nor are there any indications that the existing crossing is hydraulically inadequate.

(Affected Property Owner Statements must be sent to all property owners impacted by the proposed flood stage increase.)

SAMPLE AFFECTED PROPERTY OWNER STATEMENT

Department of Environmental Quality
Land and Water Management Division
Transportation and Flood Hazard Unit
PO Box 30458
Lansing, MI. 48909-7958

Date:

Dear _____:

SUBJECT: File _____

I/we (**circle one**) have been informed by representatives of the _____ County Road Commission of a potential increased flood risk on my property. The increased risk would be caused by replacing the existing _____ ft. span by _____ ft. rise (structure type) at the _____ Road crossing of _____ Creek with a _____ ft. span by _____ ft. rise (structure type). Installation of this structure will cause an additional increase in the floodplain elevation at the upstream limits of the road right-of-way of _____ feet (elevation = _____) over existing floodplain conditions.

I understand that this increased floodplain elevation could cause flooding on my property during a 100-year flood which has a 1 percent chance of occurring or being exceeded in any given year. I also understand that the proposed structure could increase flooding on my property during lesser flood frequencies.

It is my opinion that this project will/will not (**circle one**) cause any of the following to my property:

a) damage to property, b) threat to life, c) a threat to personal injury.

I can/cannot (**circle one**) recall any past flooding which has caused flood damage to my property. I can/cannot (**circle one**) recall that water has overtopped the existing road grade at the bridge/culvert location.

Should additional information be required of me, I can be reached by writing _____ or telephone _____.

Sincerely,

Property Owner(s) Signature(s)
Address
Phone
Property Tax ID

(Form must be returned to the DEQ within 10 days)

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CROSS SECTIONS

The computation of water surface profiles requires cross-sections at representative locations throughout the river reach. When a river reach is fairly straight and uniform, cross-sections may be taken at regular intervals not exceeding 500 feet. Cross-sections should fully define transitional elements of a stream such as; the cross-sectional area increasing or decreasing, channel or overbank roughness changes, or marked breaks in bottom slope. When an abrupt change in cross-section occurs, such as at bridges, dams or other manmade or natural restrictions, several cross-sections should be used to describe the change, regardless of the distance.

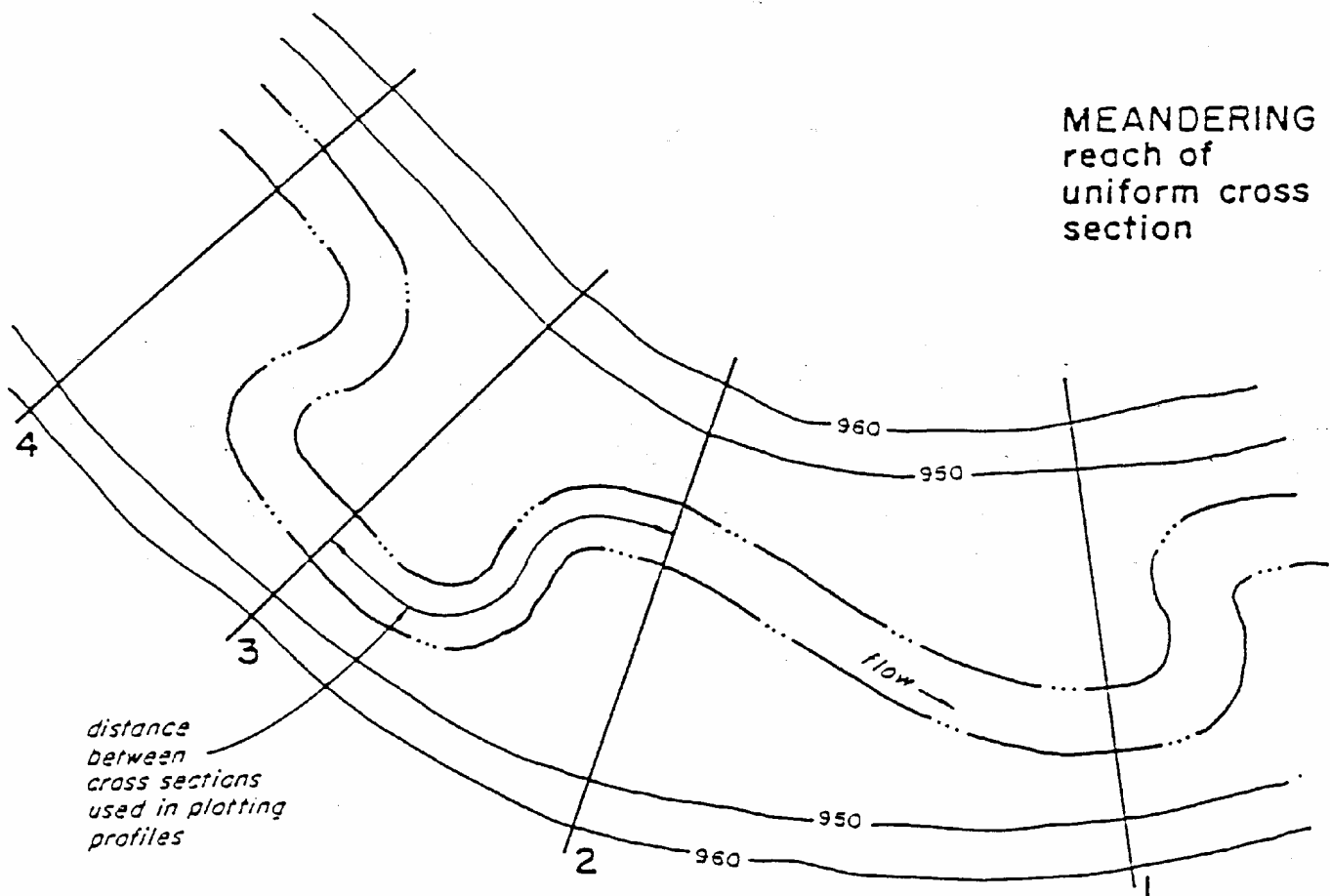
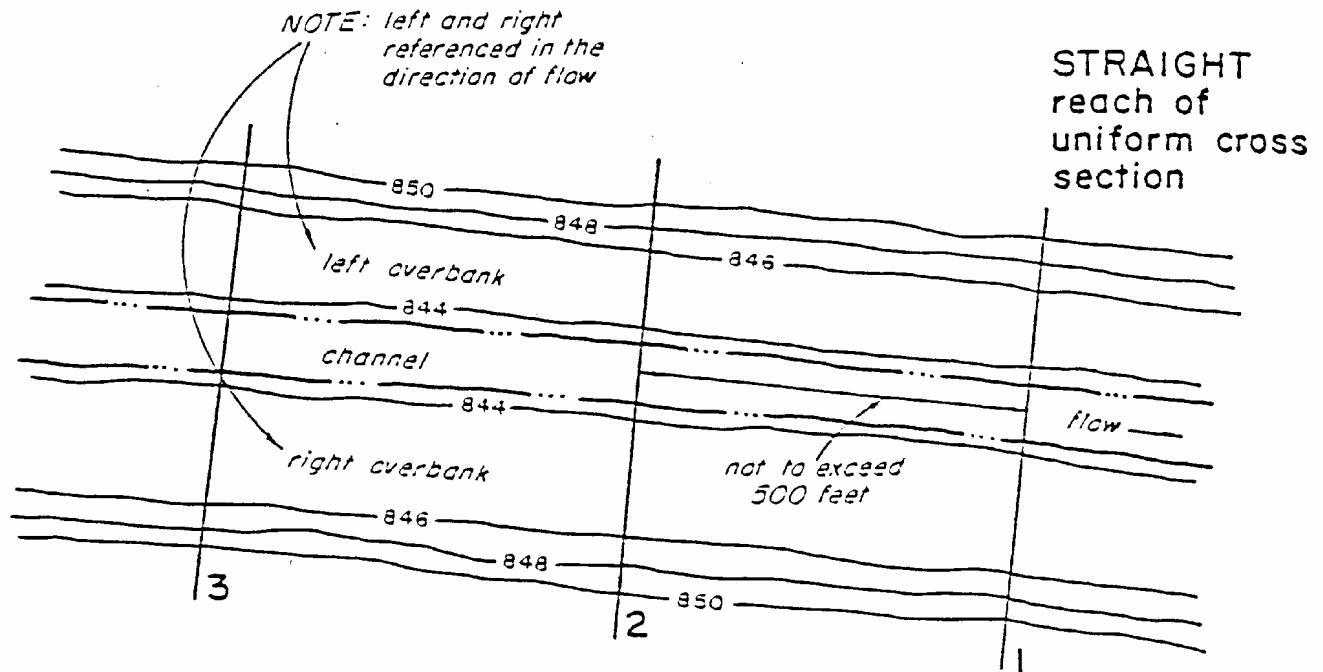
Cross-sections should be taken perpendicular to the direction of the estimated center of mass of the flood flow. This direction, in some instances, may differ materially from that of the normal flow in the channel. Every effort should be made to obtain cross-sections that accurately represent the river geometry at all stages.

Each cross-section should be plotted at a reasonable scale with the left and right corresponding to that when viewed in the direction of flow (i.e. looking downstream). For each plotted point, the distance measured from a reference point on the left, and elevation should be shown. The water surface elevation and date taken should be included on each of the plotted cross-sections.

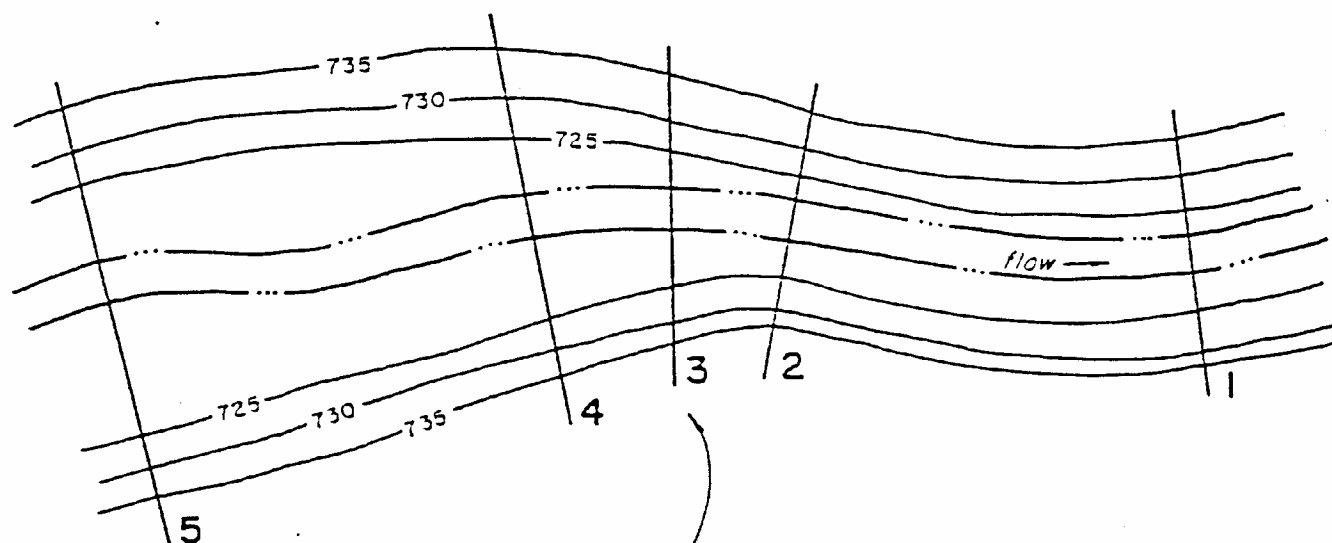
Each cross-section should be located on a topographic map of sufficient detail in order that the channel and overbank distances between sections can be measured accurately.

A profile of the channel bottom and water surface should be plotted from the cross-section data. The plotted distance between cross-sections being that measured along the main channel during normal flow.

The following are some typical examples to serve as an aide in determining the proper location for cross-sections.

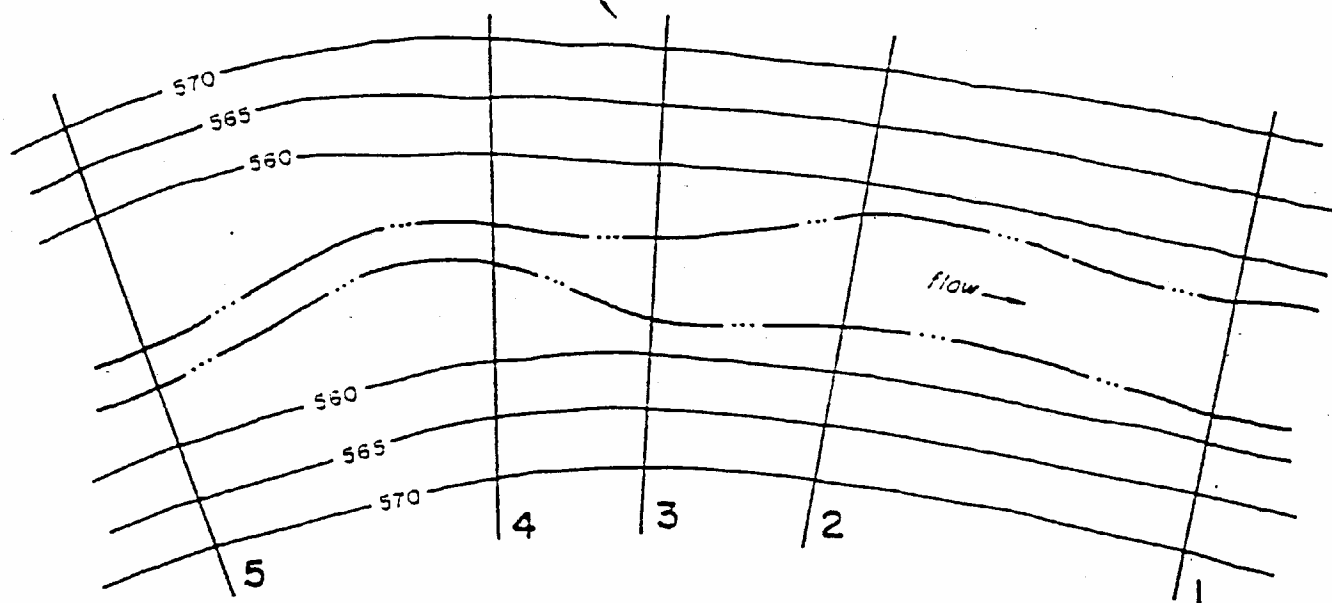


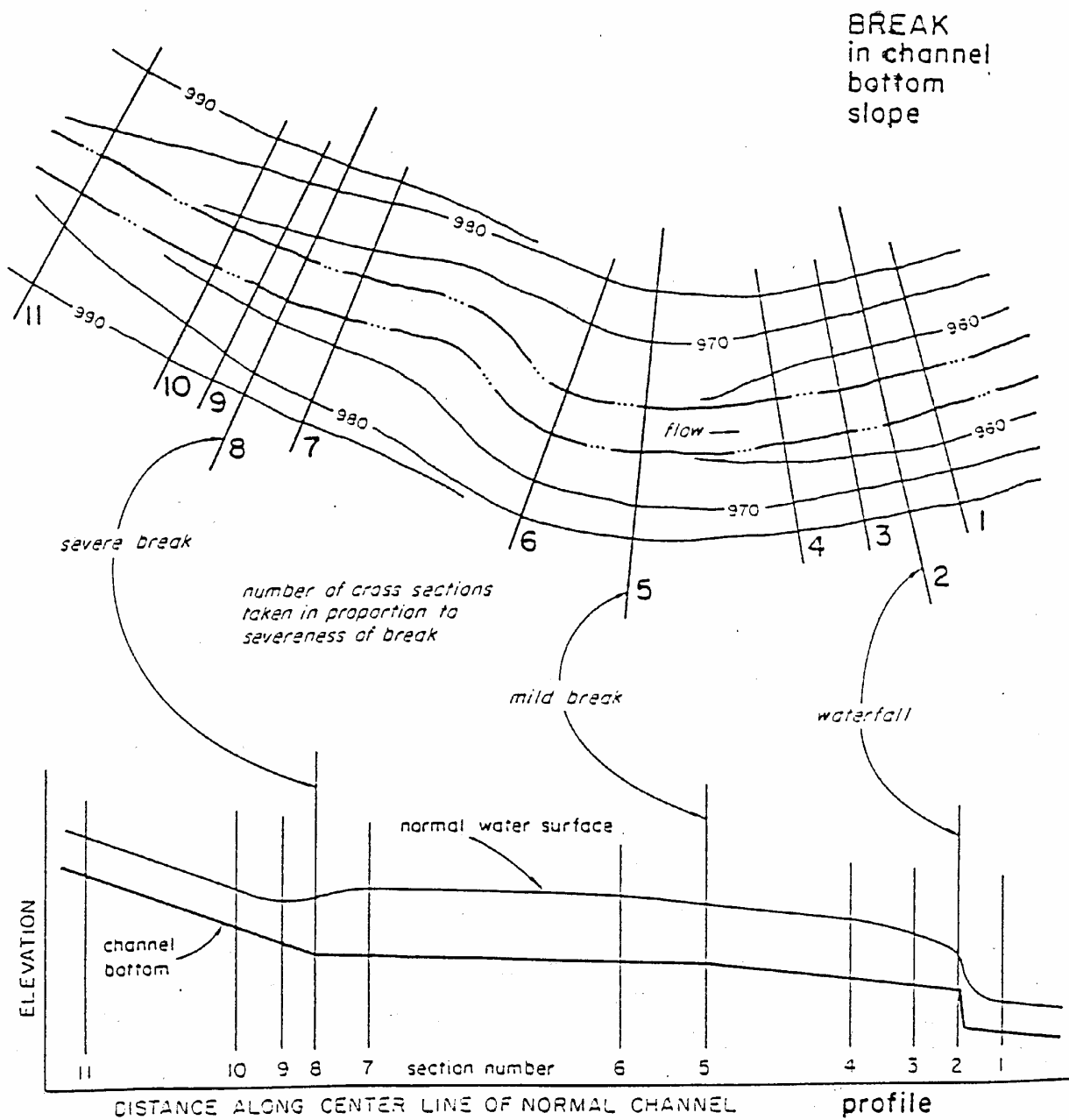
CONTRACTION
of overbank
flow area



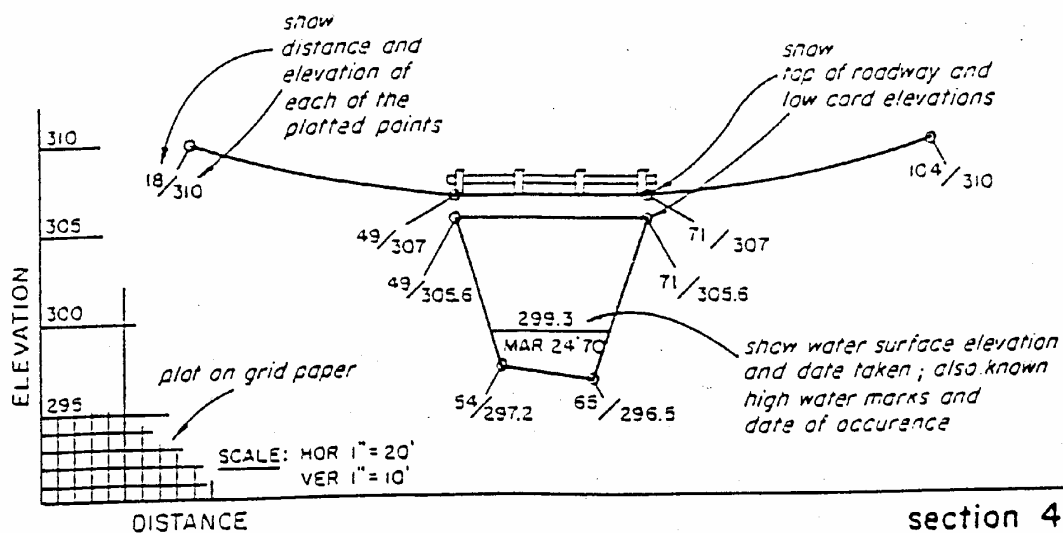
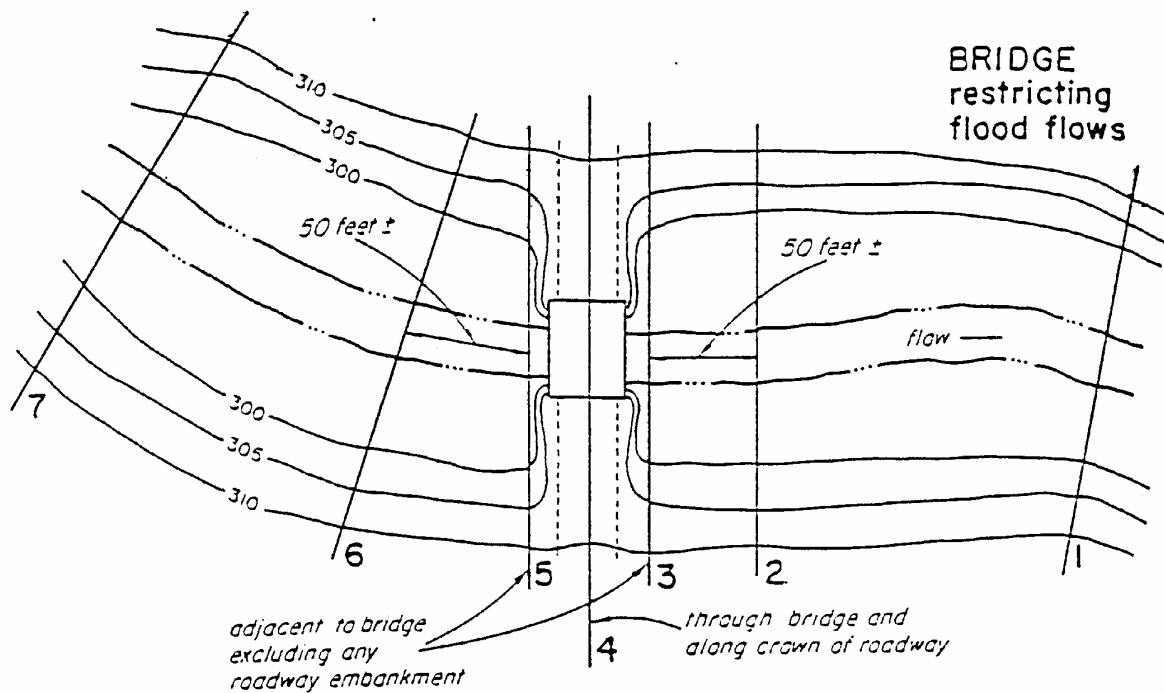
*cross sections
spaced in
proportion
to abruptness
of change*

EXPANSION
of channel





NOTE: profiles should be plotted
on grid paper ; indicate
horizontal and vertical scales



section 4

NOTE: cross sections taken at same locations for culverts; include up and down stream invert elevations